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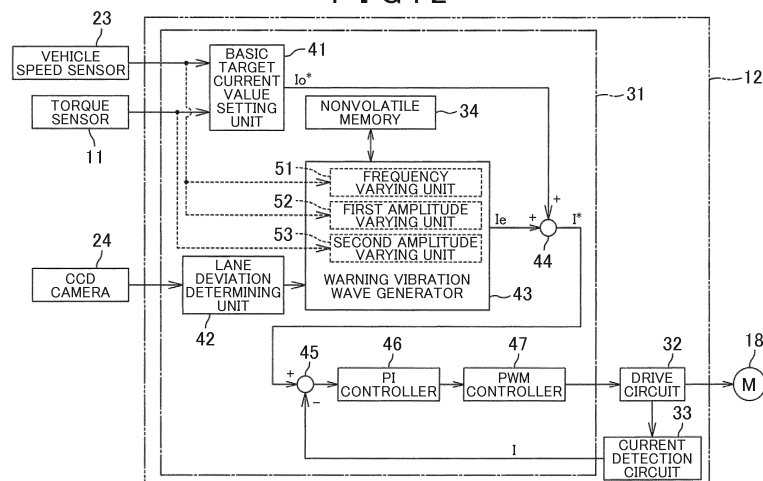
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(54) **Warning device for vehicle**

(57) In a warning device for a vehicle, a basic target current value setting unit (41) sets a basic target current value ( $I_o^*$ ) based on a steering torque (T) and a vehicle speed (V). When a lane deviation determining unit (42) determines that there is a high possibility that a vehicle will deviate from a lane, a warning vibration wave generator (43) generates a warning vibration wave (Ie) con-

taining a plurality of frequency components. A target current value (I\*) is computed by adding the warning vibration wave (Ie) to the basic target current value ( $I_o^*$ ). A motor current (I) to be applied to an electric motor (18) is controlled so as to approach the target current value ( $I^*$ ).

**FIG. 2**





## EUROPEAN SEARCH REPORT

 Application Number  
 EP 14 18 9938

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y A	DE 10 2005 048542 A1 (BOSCH GMBH ROBERT [DE]) 12 April 2007 (2007-04-12) * paragraphs [0004] - [0011] *	1,3-6,8,11,12 2,7,9,10,13,14	INV. B60W50/16 B62D1/04
Y	US 2009/273458 A1 (ALMQVIST SVEN [SE] ET AL) 5 November 2009 (2009-11-05) * paragraphs [0018], [0051] - [0053] *	1,3-8,11,12	
Y	EP 0 718 173 A2 (KOYO SEIKO CO [JP]) 26 June 1996 (1996-06-26) * column 6, line 56 - column 10, line 13 *	1,7,8,11	
Y	DE 10 2005 036219 A1 (BAYERISCHE MOTOREN WERKE AG [DE]) 8 February 2007 (2007-02-08) * paragraph [0013] *	1	
A	EP 2 272 735 A1 (JTEKT CORP [JP]) 12 January 2011 (2011-01-12) * paragraphs [0019], [0022], [0028], [0030] *	13,14	TECHNICAL FIELDS SEARCHED (IPC)
A	EP 2 135 789 A1 (HONDA MOTOR CO LTD [JP]) 23 December 2009 (2009-12-23) * paragraphs [0005], [0028] *	13,14	B60W B62D
The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>25 January 2017</b>	Examiner <b>Müller-Nagy, Andrea</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION  
SHEET B**

Application Number  
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-12

Warning device providing a warning vibration wave containing a plurality of frequency components

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2. claims: 13, 14

Warning device having a prescribed frequency of which gain and phase delay fulfil predetermined conditions

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102005048542 A1	12-04-2007	DE 102005048542 A1	12-04-2007
		WO 2007042355 A1	19-04-2007
-----			
US 2009273458 A1	05-11-2009	CN 101448667 A	03-06-2009
		EP 2032382 A1	11-03-2009
		JP 5200008 B2	15-05-2013
		JP 2009538252 A	05-11-2009
		KR 20090018785 A	23-02-2009
		RU 2008142378 A	27-04-2010
		SE 529656 C2	16-10-2007
		US 2009273458 A1	05-11-2009
		WO 2007136338 A1	29-11-2007
-----			
EP 0718173 A2	26-06-1996	DE 69526778 D1	27-06-2002
		DE 69526778 T2	28-11-2002
		EP 0718173 A2	26-06-1996
		JP 3523698 B2	26-04-2004
		JP H08175413 A	09-07-1996
		US 5667033 A	16-09-1997
-----			
DE 102005036219 A1	08-02-2007	NONE	
-----			
EP 2272735 A1	12-01-2011	CN 101947973 A	19-01-2011
		EP 2272735 A1	12-01-2011
		JP 5526630 B2	18-06-2014
		JP 2011016435 A	27-01-2011
		US 2011010050 A1	13-01-2011
-----			
EP 2135789 A1	23-12-2009	AT 495074 T	15-01-2011
		EP 2135789 A1	23-12-2009
		JP 4918389 B2	18-04-2012
		JP 2008247327 A	16-10-2008
		US 2010121532 A1	13-05-2010
		WO 2008126474 A1	23-10-2008
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